automatically indicating the presence of said target object while said article of luggage or package progresses on said conveyor.

Add claims 153 and 154 that correspond respectively to claims 83 and 85 as follows:

153. The method of claim 152 wherein X-ray data from rays that pass through different regions of said target object of said specific material of interest are employed in said calculations in a manner that effectively averages many pixels over contiguous regions to reduce noise in calculating said value.

154. The method of claim 152 wherein said article of luggage or package is exposed to X-ray radiation at more than one energy to produce said X-ray data and the resulting data at more than one energy is used in calculating said value characteristic of said target object of said specific material of interest.

ACKNOWLEDGEMENT OF INTERVIEW

Applicant acknowledges with thanks the telephone interview with the Examiner on September 6 and 7, 1995. During the course of the interview, the points made in this response were discussed with the Examiner. Agreement was reached as to the allowability of claims 82 and 152 with limitations as now presented. Apparatus claim 115 has been revised in correspondence with claim 152.

REMARKS

Claims 82, 83 and 115 have been amended to clarify the contribution of the inventors and to introduce an amendment approved by the Examiner.

An independent claim 152 has been added containing all of the limitations of original dependent claim 87 and further limited to require the removal of the contribution of overlying and underlying material from the calculated value being dependent upon determining an edge of the target object, also approved by the Examiner. Claims 153 and 154, dependent on claim 152, (corresponding to claims 83 and 85) have also been added.

The inventors have realized that for identifying a target object that may be anywhere in a continuously moving ensemble of initially unidentified objects, systematically over the exposed area performing calculations, which may occur in substantially real time, utilizing rays of a stationary exposure system passing through the target object as well as rays passing near, but not through the target, to remove the contribution of material overlying and underlying the target object, and wherein (1) either the calculating step further includes choosing at least one target region, and successively examining a plurality of regions in the neighborhood of said at least one target region or (2) the removal of the contribution of overlying and underlying material from the calculated value is dependent upon determining an edge of the target object, leads to a highly effective and practical inspection system and method for continuously moving ensembles of the objects.

Simple as this may seem, these aspects have eluded the many experts that have sought to detect unidentified objects, e.g., plastic explosives covered by other objects in airport baggage. Claim 82 on one hand and claims 115 and 152 on the other hand are respectively directed to these aspects.

Corresponding claims 85 and 154, directed to use of more than one X-ray energy, bring out an important further feature that enhances the practicality of such inspection.

Corresponding claims 83 and 153, dependent respectively on claims 82 and 152, bring out the further advantageous feature of using, in each calculation, rays that pass through different regions of the target object, to, as claimed, effectively average many pixels over contiguous regions to reduce noise in calculating the value. This novel combination of features can also enhance the practicality of the system for inspecting moving objects, especially luggage.

Prior to this amendment, the Examiner rejected claims 82, 83, 87 and 115, and others over Doenges in view of Macovski, Giger and Doi, or alternatively, in view of Macovski and Alvarez.

As we will show, neither of these combinations, to the extent proper, fairly teaches the invention of claims 82 and 152 or 115, as amended, or the dependent claims.

Doenges is the only cited reference that addresses the inspection of articles on a moving conveyor.

Doenges is content in being able to distinguish organic material from e.g., metals, col. 1, ll. 65-69. Doenges can't be said to recognize, in the continuously moving conveyor context, the possibility of improving the detection e.g., of plastic explosives when they are masked by unknown objects that underlie or overlie the explosives. Doenges has no suggestion of utilizing rays passing through the target object and rays passing near as having

utility in the continuously moving conveyor context, and suggests no motivation for doing so.

The Macovski reference stands for showing that dual energy imaging has been known for over 20 years, which Applicants readily admit.

Macovski does not in any way suggest that progressively exposing continuously moving ensembles to rays from a stationary system and calculating a value based on these rays passing through the target object as well as rays passing near but not through the target object, is a practical way of improving inspection of continuously conveyed articles.

One will search the remaining references in vain for any fair teaching that would suggest the modification of Doenges to realize the result he did not even suggest.

The main thrust of Giger et al. 5,133,020 is to detect and classify lesions in medical images.

Most of the Giger disclosure concerns use of, previously known information, such as left and right architectural symmetry of the anatomy or comparing two images of the same thing taken at different times, to determine, by comparison, if there has been abnormal growth over the elapsed time (see col. 2, l. 59; col. 3, l. 14).

The Examiner directs our attention to cols. 10 and 11. Here Giger et al. were concerned with classifying lesions already detected, see Fig. 9, and thus operates at a different stage of the process than detecting a target object in the first place. Only after detection, does the passage col. 10, l. 50, come into play.

Furthermore, this medical imaging reference can hardly be said to fairly suggest the structure or operation of the present invention directed to the problem of continuously moving ensembles, and employing, as claimed, rays passing near, but not through the object as well as rays passing through the object to remove the contribution of material overlying and underlying the target object. Specifically, Giger does not employ or fairly suggest either (1) a calculating step that includes choosing at least one target region, and successively examining a plurality of regions in the neighborhood of said at least one target region or (2) a method or system in which the removal of the contribution of overlying and underlying material from a calculated value is dependent upon determining an edge of the target object.

Doi 4,851,984, directed to lung examination by removing background according to a sinusoidal function related to the periodicity of the human ribs, likewise does not make up for what the other references lack. All people have similar periodic rib structure, previously known information which Doi exploits. Baggage has no known periodic structure of this kind and the present invention makes no such use of such previously known information.

The 1977 Alvarez patent, 4,029,963, does not make up for what the other references lack. Most of Alvarez is related to computerized tomography. Computerized tomography, as commonly understood, requires the patient or object to be immobile while many X-ray images from many angles are taken to form pictures of slices of the patient or object.

It would certainly involve invention to realize that a CT technique, commonly requiring that the object be stationary for a long time, can be so modified as to have application to airport inspection of articles moving continuously on a conveyor, or similar continuously moving objects.

We submit that the Examiner may not have fully understood the significance in the March, 1995 claims of the limitations that the X-ray exposure system is stationary while the ensemble being inspected moves continuously through the beam. The present claim amendments clarify this distinction, and now clearly define applicants' important new invention over the prior art.

For the foregoing reasons, and because all other claims are either dependent on claim 82, 115 or 152 or contain all their limitations, it is submitted that the claims as they now stand in this application are clearly allowable over the references of record and early favorable action is requested.

Please charge any additional fees, or make any credits, to Deposit Account No. 06-1050.

Respectfully submitted,

Date: Sept 8, 1995

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